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IN THE UNITED STATES PATENT & TRADEMARK OFFICE

IN RE APPLICATION OF	:
KARL OTT, ET AL.	: EXAMINER: GRESO, AARON J.
SERIAL NO: 10/591,662	:
FILED: SEPTEMBER 5, 2006	: GROUP ART UNIT: 1726
FOR: NOVEL SOLVENT FOR PRODUCING POLYURETHANE DISPERSIONS	:

APPEAL BRIEF

COMMISSIONER FOR PATENTS
ALEXANDRIA, VIRGINIA 22313

SIR:

This is an appeal from the Second Rejection dated May 12, 2011. A Notice of Appeal was timely filed on September 12, 2011.

I. REAL PARTY IN INTEREST

The real party in interest in this appeal is BASF SE having an address of Ludwigshafen, Germany, 67056.

II. RELATED APPEALS AND INTERFERENCES

Appellants, Appellants' legal representative and the assignee are aware of no appeals, interferences, or judicial proceedings which may be related to, directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

III. STATUS OF THE CLAIMS

Claims 15-25 stand twice rejected and the rejections are herein appealed. Claims 1-14 are cancelled.

IV. STATUS OF THE AMENDMENTS

No amendment under 37 CFR 1.116 has been filed. A Request for Reconsideration was filed on August 12, 2011.

V. SUMMARY OF THE CLAIMED SUBJECT MATTER

It is preliminarily noted that references in brackets are to page and line number of the specification as filed.

Independent Claim 15 provides a process for preparing an aqueous polyurethane dispersion, comprising:

preparing a polyurethane by reacting at least one polyfunctional isocyanate having 4 to 30 carbon atoms [page 3, line 4] with at least one diol [page 3, line 6] in the presence of N-ethylpyrrolidone [page 2, line 27] or N-cyclohexylpyrrolidone [page 2, line 30]; and

dispersing the prepared polyurethane in an aqueous medium [page 3, line 24],

wherein

the polyurethane comprises at least one component having at least one hydrophilic group or a group which can be converted to a hydrophilic group [page 3, line 21], and is dispersible in water[page 3, line 21].

Claims 16 to 22 depend from Claim 15 and stand of fall with the independent Claim.

Dependent Claim 23 provides the process according to claim 15, wherein the polyurethane is prepared in the presence of at least one cesium salt [page 14, lines 29-33].

Dependent Claim 24 provides method for coating or adhesively bonding a material, comprising applying the aqueous polyurethane dispersion prepared according to Claim 15 to the material, wherein the material is at least one selected from the group consisting of wood, wood veneer, paper, paperboard, cardboard, textile, leather, nonwoven, plastics surfaces, glass, ceramic, mineral building materials, uncoated metals and coated metals [page 16, lines 4-7].

Claim 24 is argued independently.

Independent Claim 25 provides a method for preparing an aqueous dispersion of a water dispersible polyurethane comprising adding N-ethylpyrrolidone or N-cyclohexylpyrrolidone to a reaction of a polyisocyanate and a diol, for forming the water dispersible polyurethanes [page 16, lines 37-40].

Claim 25 is argued with Claim 15 and stands or falls with Claim 15.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Ground (A)

Claims 15-22 and 24-25 stand twice rejected under 35 U.S.C. §103(a) as unpatentable over Pears et al. (WO 99/50362)(Pears) as evidenced by Argabright (U.S. 3,526,655).

Ground (B)

Claim 23 stands twice rejected under 35 U.S.C. § 103(a), as unpatentable over Pears et al. (WO 99/50352)(Pears) as evidenced by Argabright (U.S. 3,526,655)(Argabright) in view of Bruchmann et al. (DE 10161156, US 2005/0043467 as English equivalent.)

VII. ARGUMENT

Ground (A) Rejection of Claims 15-22 and 24-25 under 35 U.S.C. §103(a) as unpatentable over Pears et al. (WO 99/50352)(Pears) as evidenced by Argabright (U.S. 3,526,655)(Argabright).

Claims 15-22, 25

Claim 15 provides a process for preparing an aqueous polyurethane dispersion, wherein at least one polyfunctional isocyanate having 4 to 30 carbon atoms is reacted with at least one diol **in the presence of N-ethyl-pyrrolidone or N-cyclohexylpyrrolidone.**

The specification lists the following as advantages of the dispersion that may be obtained according to the method of Claim 15 (page 16, line 24 to page 17, line 2):

> The inventive preparation of the polyurethanes in the presence of N-(cyclo)alkylpyrrolidones leads to at least one of the following advantages:
>
> - Reduced solvent requirement.
> - The dispersions are easier to apply by spraying or through nozzles, since encrustation or contamination on spraying tools is reduced.
> - Lower toxicity than, for example, N-methylpyrrolidone.

- The prepolymer solutions have a lower viscosity.
- The rheology of the polyurethane dispersions is improved.
- The wetting behavior of substrates or additives is improved.
- Lower yellowing under light and/or heat exposure.
- Greater frost resistance of the dispersions.
- Improved flexibility, particularly lower-temperature flexibility, of the resultant films.
- Higher gloss of the resultant films.

> Whereas the subsequent addition of N-alkylpyrrolidones, as known from the prior art, serves merely to adjust physical parameters of the finished dispersion, the inventive preparation of polyurethanes in the presence of N-(cyclo)alkylpyrrolidones leads to advantages associated with the preparation of the polyurethanes, which would not be possible to achieve by subsequent addition. One possible reason for this might be that the polyurethanes prepared inventively absorb the N-(cyclo)alkylpyrrolidone by swelling, for example, over the whole of the cross section, whereas in the case of subsequent addition only superficial absorption, at best, can take place.

As indicated in the declaration by Dr. Karl Häberle, an inventor of record in the above-identified application, submitted July 7, 2008, and again on April 8, 2011, polyurethane dispersions of the same components, differing only that the comparative example was reacted in N-methylpyrrolidone, whereas Examples 1 and 2, according to Claim 15, were reacted in N-ethylpyrrolidone and N-cyclohexylpyrrolidone, show unexpectedly different performance with respect to steam resistance. The results are shown in the following Table.

Example	Evaluation of Steam Resistance
Comparative	(2) film is severely discolored
Example 1	(0) film shows no change
Example 2	(0) film shows no change

The improvement in steam resistance obtained with the polyurethane dispersions according to Claim 15 is significant and demonstrates a useful performance advantage in coating applications such as described on page 16, lines 13-19, in the specification.

Pears describes a method to prepare colored polyurethanes and inkjet inks containing the colored polyurethanes. The polyurethanes are prepared by i) reaction of an organic

polyisocyanate and at least one isocyanate reactive compound having water-dispersing groups. In a second step, a chromophoric molecule having a group reactive to a chain terminal functionality is reacted with the polyurethane chain and terminates the chain (page 1, lines 23-30). Pears describes water-miscible solvents suitable for lowering the viscosity of the polymerization step i) on page 4, lines 29-32. The list includes N-methylpyrrolidone, dimethyl sulphoxide, a dialkyl ether of a glycol acetate and methyl ethyl ketone.

Pears further describes that once the water dissipatable polyurethane is prepared, it is isolated and placed in a liquid medium suitable for preparation of an ink-jet ink. The ink solvent medium may be aqueous or non-aqueous and a list of suitable solvents presented on page 7, lines 16-34, includes N-methyl-pyrrolidone and N-ethyl-pyrrolidone.

Pears provides the two lists for different purposes and one of ordinary skill recognizes that the two lists are not interchangeable. The list on page 7 includes alcohols which would compete for reaction with the polyisocyanate group during the polymerization stage i), and therefore, it is clear that the second list is provided for use as a solvent or diluent for the prepared polyurethane.

The Examiner acknowledges that Pears does not indicate that the polyisocyanate is made in N-ethyl-pyrrolidone (Official Action dated May 12, 2011, page 4, lines 5-6) and alleges obviousness based on homology.

However, as described above, evidence of superior steam resistance is obtained with the dispersion according to Claim 15. The homologous relationship noted by the Examiner would lead one of ordinary skill in the art to expect similar performance and such difference in performance results provided by Dr. Häberle are clearly unexpected.

> A *prima facie* case of obviousness based on structural similarity is rebuttable by proof that the claimed compounds possess unexpectedly advantageous or superior properties. *In re Papesch*, 315 F.2d 381, 137 USPQ 43 (CCPA 1963)

In the Advisory Action of August 22, 2011, the Examiner has discounted the data of Dr. Häberle's declaration with the following paragraph (continuation page, paragraph beginning at line 8):

> Applicant Affidavit filed does not further compare the unexpected results for compositions of the closest prior art. Although the Affidavit is applicable to the instant Specification, to which instant claims are not limited; in the present case, the Affidavit does not further include an evaluation for test results identified as a composition in the prior art of record. The prior art of record comprises a colorant; as such, the affidavit is taken as not providing for unexpected results in regard to the prior art of record.

The Examiner's statement indicates that the intent and objective of the declaration is not understood.

> Evidence of unexpected properties may be in the form of a direct or indirect **comparison of the claimed invention with the closest prior art which is commensurate in scope with the claims.** *In re Boesch*, 617F2d 272, 205 USPQ 215 (CCPA 1980)(Bold added for emphasis)

The Examiner appears to require that the colored polyurethanes of Pears be prepared for comparison. Such requirement is illogical. The invention according to Claim 15 provides a process for the preparation of an aqueous polyurethane dispersion. Inclusion of a chromophoric molecule as a urethane chain terminator is not an element of Claim 15 or any other claim according to the present invention. Pears describes preparation of a polyurethane in the presence of N-methylpyrrolidone. In contrast, in the method according to Claim 15, the polyurethane is prepared in the presence of N-ethylpyrrolidone or N-cyclohexyl-pyrrolidone. The data of the declaration shows that unexpected and significant improvement in steam resistance is obtained with the dispersion obtained according to Claim 15. Preparation of a dispersion of a colored polyurethane according to Pears would not be commensurate in scope with the invention as claimed.

The Examiner further concludes(continuation page, paragraph beginning at line 30):

> Further when steam is taken as hydro material (material):
> When placing more hydrophobic moieties in a composition, it would be expected by one of ordinary skill in the art that when including more hydrophobic moieties, such as additional CH2 or clclohexy (cyclohexyl) group, in a composition, would avail the composition to be more hydrophobic. As steam is taken as hydro material, a more hydrophobic material would be expected to be more phobic to steam.

However, the Examiner's hypothesis is not consistent with the data. Both films prepared with polyurethane dispersions containing N-ethylpyrrolidone or N-cyclohexyl-pyrrolidone according to Claim 15, show no change in coloration. In contrast, the film prepared with a polyurethane dispersion where the polyurethane was prepared in the presence of N-methylpyrrolidone shows severe discoloration. Based on the Examiner's hypothesis, one would expect a gradation of discoloration progressing from N-cyclohexylpyrrolidone to N-ethylpyrrolidone to N-methylpyrrolidone, consistent with increasing hydrophobic character.

Argabright is cited as an evidentiary reference which shows both materials are aprotic solvents (Official Action dated May 12, 2011, page 3, second paragraph). Argabright describes a reaction of a metal cyanate and an alkyl halide to form an isocyanate and as such technology is not related to the synthesis of polyurethane polymers, the secondary reference is unrelated. Moreover, if the apparent equivalency of N-methylpyrrolidone and N-ethylpyrrolidone as high-dielectric-aprotic solvents is considered, such consideration would render the results provided in Dr. Häberle's declaration totally unexpected and further support the rebuttal of the *prima facie* case of obviousness.

As the *prima facie* case of obviousness over the cited reference combination is rebutted by the showing of unexpected superior performance described above, the rejection of Claims 15-22 and 24-25 under 35 U.S.C. 103(a) over Pears as evidenced by Argabright should be reversed.

Claim 24

Pears is directed to polyurethane colorants as colorant components in inkjet inks (page 1, lines 20-22). Such inks have specific requirements associated with stability and performance in a printer (page 1, lines 6-15). Pears describes that in preparation of inks the colored polyurethanes are purified and isolated as dried materials. The dried polyurethane is then dissolved in an ink solvent system (page 14, lines 20-29) and printed onto paper from an inkjet printer (page 14, lines 30-32). Nowhere does Pears disclose or suggest utility of the colored polyurethane as a coating or adhesive for the materials listed in Claim 24.

In consideration of the intended utility of the polyurethane dispersions according to Claim 15 as recited in Claim 24, the superior steam resistance shown in Dr. Häberle's declaration is particularly relevant. The steam resistance results indicate that coatings and bondings obtained by application of the polyurethane dispersions of Claim 15 would have improved weatherability performance.

Pears is not directed to such application and does pertain to the same field of endeavor as the present invention. Accordingly, the Examiner has not met the burden necessary to show a *prima facie* case of obviousness and the rejection of Claim 24 should be reversed.

Ground B. Rejection of Claim 23 under 35 U.S.C. § 103(a) over Pears et al. (WO 99/50352)(Pears) as evidenced by Argabright (U.S. 3,526,655)(Argabright) in view of Bruchmann et al. (DE 10161156, US 2005/0043467 as English equivalent.)(Bruchman)

The *prima facie* case of obviousness over the primary reference combination is rebutted above. The Office acknowledges that Pears does not indicate employment of a cesium salt (Official Action dated May 12, 2011, page 7, line 19) and cites Bruchmann as describing an aqueous dispersion of a water dispersible polyurethane and a process for

preparing the aqueous dispersion involving reacting the monomers in the presence of a cesium salt. However, Bruchmann does not disclose or suggest the addition of N-ethyl- or N-cyclohexylpyrrolidone to the preparation of a polymer mixture as according to Claim 15 nor does the secondary reference provide any motivation that would have led one of ordinary skill in the art, at the time of the present invention, to employ N-ethyl- or N-cyclohexylpyrrolidone in the preparation of the polymer mixture. Accordingly, the secondary reference does not disclose or suggest the superior performance in terms of steam resistance obtained with the polyurethane dispersion according to Claim 15.

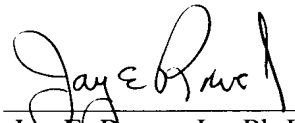
Therefore, the showing of significant and unexpected improvement in steam resistance provided in Dr. Häberle's declaration rebuts the *prima facie* case of obviousness and the rejection of Claim 23 under 35 U.S.C. 103(a) over Pears as evidenced by Argabright in view of Bruchmann should be reversed.

CONCLUSION

For all of the above reasons, Appellants submit that all outstanding rejections of record should be reversed.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.



Jay E. Rowe, Jr., Ph.D.
Registration No. 58,948

Customer Number
22850

Tel: (703) 413-3000
Fax: (703) 413 -2220
(OSMMN 08/07)

VIII. CLAIMS APPENDIX

Claims 1-14 (Canceled).

Claim 15 (Rejected): A process for preparing an aqueous polyurethane dispersion, comprising:

preparing a polyurethane by reacting at least one polyfunctional isocyanate having 4 to 30 carbon atoms with at least one diol in the presence of N-ethylpyrrolidone or N-cyclohexylpyrrolidone; and

dispersing the prepared polyurethane in an aqueous medium,

wherein

the polyurethane comprises at least one component having at least one hydrophilic group or a group which can be converted to a hydrophilic group, and is dispersible in water.

Claim 16 (Rejected): The process according to claim 15, wherein the preparing a polyurethane in the presence of N-ethylpyrrolidone or N-cyclohexylpyrrolidone comprises reacting

a) the at least one polyfunctional isocyanate having 4 to 30 carbon atoms, with

b) diols comprising

b1) 10 to 100 mol%, based on the total amount of diols (b), having a molecular weight of from 500 to 5000 and

b2) 0 to 90 mol%, based on the total amount of diols (b), having a molecular weight of from 60 to 500 g/mol,

c) optionally additional polyfunctional compounds, other than the diols (b), containing reactive groups which are alcoholic hydroxyl groups or primary or secondary amino groups and

d) monomers other than the monomers a), b) and c), containing at least one isocyanate group or at least one isocyanato-reactive group, additionally carrying at least one hydrophilic group or a group which can be converted to a hydrophilic group.

Claim 17 (Rejected): The process according to claim 16, wherein component d) is at least one hydroxycarboxylic acid.

Claim 18 (Rejected): The process according to claim 17, wherein the at least one hydroxycarboxylic acid is a dihydroxyalkylcarboxylic acid.

Claim 19 (Rejected): The process according to claim 17, wherein the at least one hydroxycarboxylic acid is an α,α-bis(hydroxymethyl)-carboxylic acid.

Claim 20 (Rejected): The process according to claim 17, wherein the at least one hydroxycarboxylic acid is at least one selected from the group consisting of dimethylolbutyric acid and dimethylolpropionic acid.

Claim 21 (Rejected): The process according to claim 20, wherein the at least one hydroxycarboxylic acid is dimethylolpropionic acid.

Claim 22 (Rejected): The process according to claim 16, wherein the hydrophilic group of components d) comprises nonionic and ionic groups.

Claim 23 (Rejected): The process according to claim 15, wherein the polyurethane is prepared in the presence of at least one cesium salt.

Claim 24 (Rejected): A method for coating or adhesively bonding a material, comprising applying the aqueous polyurethane dispersion prepared according to Claim 15 to the material,

wherein the material is at least one selected from the group consisting of wood, wood veneer, paper, paperboard, cardboard, textile, leather, nonwoven, plastics surfaces, glass, ceramic, mineral building materials, uncoated metals and coated metals.

Claim 25 (Rejected): A method for preparing an aqueous dispersion of a water dispersible polyurethane comprising adding N-ethylpyrrolidone or N-cyclohexylpyrrolidone to a reaction of a polyisocyanate and a diol, for forming the water dispersible polyurethanes.

IX. EVIDENCE APPENDIX

Declaration under 37 C.F.R. § 1.132 by Dr. Karl Häberle

X. RELATED PROCEEDINGS APPENDIX

None